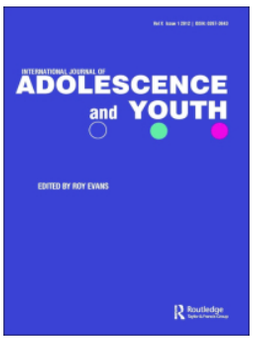

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Impacts of alcohol consumption by mothers and fathers, parental monitoring, adolescent disclosure and novelty-seeking behaviour on the likelihood of alcohol use and inebriation among adolescents

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ABSTRACT

The aim of this prospective cohort study was to examine how alcohol consumption by mothers and fathers, parental monitoring (knowledge, control and solicitation), adolescent disclosure and novelty seeking were associated with the likelihood of alcohol use and inebriation among adolescents in three different age groups (13–14 years, 14–15 years, and 17 years). The results showed that alcohol consumption by parents is of significance for adolescent alcohol consumption (odds ratio mothers: 1.47 [1.17–1.84], odds ratio fathers 1.33 [1.08–1.65]) and inebriation, especially in the 17-year-old age group. The results showed that novelty seeking was a strong risk factor in all three age groups, while parental control and knowledge had no impact. This study shows that parental solicitation increased the odds at age 17 for alcohol consumption (2.64 [1.02–6.83]) and inebriation, while adolescent disclosure decreased the odds (0.18 [0.05–0.68]). In summary, the study shows that parents should be particularly attentive to adolescents with high novelty-seeking behaviour and that parental alcohol consumption influences adolescent alcohol habits.

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Alcohol use and inebriation; adolescents; mothers and fathers alcohol consumption; parental monitoring; adolescent disclosure; novelty seeking

Adolescence is a critical period in human development; initiation and escalation of alcohol consumption often occur during these years (Windle et al., 2008). Alcohol consumption in adolescence increases the risk of accidents, negative psychological and physiological health outcomes and development of alcohol problems during adulthood (Marshall, 2014).

The present study is rooted in Jessor's (1991) theory concerning risk factors for problem behaviour during adolescence, which describes how both environmental factors, such as the family environment with parents as role models including interaction with parents, as well as individual factors are important for a better understanding of adolescent development and why certain adolescents exposes themselves to risk.

Parents influence children and adolescents in many ways, including through their own drinking behaviours and parenting practices. Social cognitive theory (Bandura, 1977) emphasizes how children learn by observing others as role models and then imitating their behaviour, probably by an indirect process which some refer to as intergenerational transference (Campbell & Oei, 2010) or

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delayed modelling (Bandura, 1986). Through this indirect process, children will create representations and ideas about parents´ behaviours, so called internal working models (Bretherton, 1999) or outcome expectancies (Pajares, 1997) that are intended to guide their own behaviours in the future.

Rossow et al. (2016) conducted a systematic search for prospective cohort studies that investigate the impact of parental drinking on their offspring. Most of the 21 included studies found that parental drinking affects adolescent drinking. However, the authors concluded that there is still insufficient evidence, since most of these studies lack both a theoretical basis and the capacity to draw causal inferences (ibid). There is also inconsistency regarding the impact of alcohol consumption by mothers and fathers, respectively, on adolescent alcohol consumption (Rossow et al., 2016).

Parental monitoring (an environmental protective factor) entails efforts on the part of parents to acquire knowledge concerning the child's activities, whereabouts and associations through their own observations and by asking the child questions (Dishion & McMahon, 1998). Parental monitoring is purported to protect against risk behaviours in adolescence, such as early initiation of alcohol and drug use (e.g. Dodge et al., 2009; Kopak et al., 2011). Parental monitoring is exercised using different sources: knowledge (how much parents know about their children's activities, whereabouts and associations), solicitation (actively asking the adolescent and his/her friends for information) and control (e.g. behavioural control by setting rules and regulations) (Kerr & Stattin, 2000). One source of parental knowledge is information provided by children regarding their whereabouts. Kerr et al. (2010) found that voluntary disclosure is a better source of parental knowledge than parental control and solicitation.

A recent meta-analysis found evidence to support that parenting per se influences alcohol habits in adolescents, but the effect sizes are relatively weak (Yap et al., 2017). However, the mechanisms underlying alcohol use among parents, parental monitoring and alcohol consumption by adolescents require further clarification. Mahedy et al. (2018) examined the influence of parental alcohol use on adolescent alcohol use, and whether this association was mediated by parental monitoring. Peer deviance and early alcohol initiation mediated the association, while parental monitoring did not. However, in this study parental monitoring was evaluated by a 12-item self-rating scale that did not specifically examine the effect of control, solicitation and child disclosure. In contrast, another study found that parental control (parent-driven rules) and parental solicitation (actively asking adolescents and others about information) affected alcohol consumption in their offspring (Latendresse et al., 2008).

According to Jessor's theory (Jessor, 1991) an individual risk (or protective) factor is temperament. Temperament is an innate driving force to react in a certain way when exposed to a stimulus (reflecting differences in excitability and arousability in the physiological systems in the brain) (Rothbart, 2011). Temperament has a strong genetic hereditary component and develops under the influence of the environment during childhood into temperamental traits. Temperamental traits tend to be relatively consistent over time (Garcia et al., 2017). Temperamental traits for predicting alcohol use and inebriation during adolescence have been well studied and novelty seeking (a temperamental trait associated with behaviours such as impulsivity, inhibitory control, sensation seeking, need for exploration, extravagance and disorderliness) (Garcia et al., 2017; Zuckerman et al., 1964) has been strongly associated with alcohol use and inebriation (Adan et al., 2017). However, the explanatory value of novelty seeking, in different ages during adolescence, when one takes into account parental monitoring and parental alcohol use is as far as we know not well studied.

The present study examines how alcohol consumption by parents with moderate use of alcohol [measured when their children were 12–13 years (T1)] relates to likelihood of alcohol use [drinking more than a mere sip in the past year] and alcohol inebriation [being drunk in the past year] by adolescents aged 13–14 years (T2), 14–15 years (T3), and 17 years (T4). Numerous studies have focused on alcohol use among children and adolescents whose parents have severe alcohol problems (e.g. Ossola et al., 2021; Park & Schepp, 2014), but few studies have examined whether adolescent alcohol consumption can also be influenced by less risky use of alcohol by parents. It is important to examine the mechanisms underlying alcohol consumption by adolescents coming

from families with more moderate use of alcohol, in order to increase societal understanding and implications for future policy. It also examines how parental monitoring (parental knowledge, control and solicitation) and adolescent disclosure are associated with the likelihood of adolescent alcohol use and inebriation in three different age groups. We also address novelty seeking as a personality trait, already known to be a significant individual risk factor for risky behaviours such as alcohol consumption and inebriation during adolescence (Boson et al., 2019), as we want to explore the collective explanatory value of alcohol consumption by parents, parental monitoring and the individual risk-factor novelty seeking. The present study is inspired by Jessor's (1991) theory of both environmental and individual factors for problem behaviour during adolescence

We expected to find that higher alcohol consumption among parents (mothers and fathers) would be associated with a higher risk of alcohol consumption and inebriation among adolescents. We also expected to find that parental monitoring and adolescent disclosure would lower risk, while novelty seeking would increase risk of alcohol consumption and inebriation among adolescents.

This study separately addresses three different age groups since it aims to investigate whether risk factors differ among them, as shown by prior studies (Rogers et al., 2018; Thompson et al., 2015). Our study also examines alcohol consumption by mothers and fathers, respectively, since earlier studies have already shown that mothers and fathers can influence their children's alcohol consumption, although further studies are still needed to clarify this association (Rossow et al., 2016).

Methods

This study is part of the Longitudinal Research on Development In Adolescence (LoRDIA) project, which examines risks and protective factors among adolescents, over time, within the general population. All adolescents age 12 and 13 years (N = 2150) living in four cities (two small and two mid-sized) in Sweden were invited to complete an annual questionnaire at school. Parents whose children participated in the survey at baseline 2013 (T1) were also invited to take part in the project. Questionnaires were sent to parents by email. For a detailed description of the LoRDIA project, see Boson et al. (2016; 2019) and Kapetanovic, Bohlin, etal., 2020. Ethical approval for the LoRDIA project was obtained from the Regional Research Ethics Board in Gothenburg: 25 September 2013 (No. T362–13); 20 May 2014 (No. T446–14) and 31 July 2015 (No. T553–15).

Participants and procedure

We used five data sets in this study: the parental survey ($n = 546$) from T1 (baseline), and the adolescent surveys from T1 ($n = 1515$, age: 12.59 ± 0.62), T2 ($n = 1459$, age: 13.35 ± 0.62), T3 ($n = 1321$, 14.32 ± 0.64) and T4 ($n = 948$, 16.95 ± 0.44). This resulted in the following mother-adolescent dyads T2: $n = 404$, T3: $n = 358$, T4: $n = 280$ and father-adolescent dyads T2 $n = 307$, T2: $n = 273$, T2: $n = 220$).

Attrition analysis

T2: Adolescents in the T2 analytical samples (mother-adolescent dyads and father-adolescent dyads, $n = 487$) did not differ from the other adolescents ($n = 972$) concerning alcohol consumption (16.8%) and inebriation (5.9%).

T3: Of the T2 participants, 54 adolescents failed to participate at T3. There were no differences in alcohol consumption and inebriation at T2 between those lost at T3 and those who participated at both events. At T3, the studied individuals ($n = 433$) did not differ from the bulk of adolescents ($n = 888$) concerning alcohol consumption (26.1%) and inebriation (14.0%) in comparison with T2.

T4: Of those who participated at T3, another 94 adolescents failed to participate at T4. There were no

differences in alcohol consumption and inebriation at T3 between those who failed to participate and those who continued in the study between T3 and T4. At T4, the studied individuals ($n = 339$) did not differ from the bulk of adolescents concerning alcohol consumption (63.1%) and inebriation (54.4%).

Measures

Adolescent alcohol behaviour (outcome variables in the analyses)

Adolescents were asked the following questions annually about their behaviour concerning alcohol consumption and inebriation (T1-T4): 'Did you drink more than just a mere sip of an alcoholic beverage within the last year (excluding light beer or light cider)?' and 'Have you been inebriated within the last year?' Response options were as follows: 'No', 'Once in the last year', 'Several times in the last year', 'Once a month', 'A couple of times a month' and 'Every week.' Responses were converted to binary code, 'Yes' for all responses other than a 'No,' due to limited variability.

Assessment of adolescent novelty seeking and parental monitoring scales

Novelty seeking (NS) was assessed by the adolescent (α =.68) version of the Swedish Junior Temperament and Character Inventory (JTCI; Luby et al., 1999). The Swedish JTCI is a translation of the original American version and has acceptable psychometric properties (Boson et al., 2018). JTCI consists of 108 statements to be answered as true or false. The NS subscale consists of 18 statements.

The parental knowledge, parental control, parental solicitation and adolescent disclosure scales were developed by Kerr and Stattin (2000) and Kerr et al. (2010), here with slightly modified responses (reduction of Likert scale from 5-point to 3-point: 1 =never, 2 = sometimes, 3 = often/always). Parental knowledge reflects what parents know about the behaviour of their adolescents, using six questions such as 'Do you know what your child does during his/her free time?' Parental solicitation (Kerr et al., 2010) reflects how much parents actively seek information from their adolescents or their peers, using six questions such as 'Do you ask your child to tell you about his/her friends (what they like to do and how things are in school)?' Parental control reflects the extent to which parents set rules requiring their adolescents to inform them of their whereabouts, using five questions such as "Does your child need your permission to stay out late on a weekday evening? Adolescent disclosure reflects spontaneous and voluntary disclosure by adolescents to their parents concerning leisure-time activities using five questions such as 'When your child has been out in the evening, does he or she talk about what he or she has done that evening.'

Parental alcohol use

Mothers and fathers completed a parental questionnaire sent by email, including the three first questions in AUDIT, which is a validated, widely used alcohol screening test consisting of ten questions (Saunders et al., 1993). The AUDIT-C screening test includes the first three items of the AUDIT and has been validated in the general population as well as in different patient groups (Bradley et al., 2007; Dawson et al., 2005; Rose et al., 2008; Wade et al., 2014). The questions are: How often do you have a drink of alcohol? Response categories are: 0 = Never, 1 = Monthly or less, 2 = 2–4 times a month, 3 = 2–3 times a week and 4 = 4 or more times a week, *How many drinks containing alcohol do you have on a typical day when you are drinking?* Response categories are 0 = 1 or 2 drinks, 1 = 3 or 4 drinks, 2 = 5 or 6 drinks, 3 = 7 to 9 drinks and 4 = 10 or more drinks. How often do you have six or more drinks on one occasion? Response categories are 0 = Never, 1 = Less than monthly, 2 = Monthly, 3 = Weekly and 4 = Daily or almost every day. Scoring for the response categories ranges from 0 to 4; hence the maximum score is 12.

Confounding variables

(a) Parental marital status (T1). Parents were asked: Are the parents of the child currently living together? Response options: 1 = Married or cohabiting, 2 = Divorced or separated 3 = Never

lived together 4 = Other. Responses were converted to binary code using 0 = for married or cohabiting, 1 = for all other responses.

(b) Inebriated peers (T2). Adolescents were asked if they have friends who sometimes get drunk, with no coded as 0 and yes coded as 1.

(c) Gender of adolescents (T1). Adolescents answered how they defined themselves: female (coded as 0), male (coded as 1) or other. No adolescents defined themselves as other.

(d) Parental education and work situation (T1). Parents were asked about their level of education. No higher education was coded as 1 and higher education (university) was coded as 0. They were also asked about their work situation. Employment (full time or part time) or ongoing studies were coded as 0 and unemployment, sick leave, or other were coded as 1.

(e) Adolescent behaviour concerning alcohol consumption and inebriation. We controlled for earlier experiences concerning alcohol consumption and inebriation (variable describing exposure to alcohol in the preceding year)

(f) Heredity. Parents answered a question concerning family history pertaining to alcohol problems (siblings, mother or father). Family history was coded as 1 and no family history was coded as 0

(g) Access to alcohol. In T1, T2 and T3, adolescents were asked whether they could gain access to alcoholic beverages within 24 hours pertaining to light beer, alcohol via Systembolaget (state liquor store), or smuggled alcoholic beverages. 'No' to all three questions was coded as 0 and 'yes' to one or more questions was coded as 1.

Data analysis

Descriptive analyses of univariate correlations were undertaken for key study variables. Logistic regressions were carried out in which we predicted the likelihood of a) adolescent alcohol use and b) adolescent alcohol inebriation at T2, T3 and T4 according to multiple variables, including: maternal alcohol consumption (model 1), paternal alcohol consumption (model 2), adolescent NS, parental monitoring (parental knowledge, parental solicitation, parental control, adolescent disclosure) and all covariates (parental marital status, adolescent gender, inebriation among peers, parental education and work situation, family history, prior alcohol consumption and access to alcohol). Assumptions of multicollinearity were met for all analyses (tolerance >0.1). Inspection of standardized residuals revealed the following numbers of outliers: Mother-adolescent dyad (any history of alcohol consumption): T2 $n = 13$, T3 $n = 12$, T4 $n = 4$. Mother-adolescent dyad (any history of alcohol inebriation): T2 $n = 5$, T3 $n = 12$, T4, $n = 3$. Father-adolescent dyad (any history of alcohol consumption): T2 $n = 9$, T3 $n = 11$, T4 $n = 4$. Father-adolescent dyad (any history of alcohol inebriation): T2 $n = 5$, T3 $n = 6$, T4, $n = 1$. Outliers were kept in the dataset. When using scales, mean imputation was used when 70% of items were answered, in which each missing value was replaced, or imputed, with the mean of observed values of that variable.

Results

Predicting alcohol use

Table 1 provides the adjusted models for predicting alcohol use within the past year.

Mother – adolescent dyads at T2, T3 and T4

T2: The adjusted model showed statistical significance (χ^2 (1, 14, $N = 343$) = 92.71, $p < .001$). Novelty seeking was the only significant predictor (OR = 1.15, $p < .02$, 95% CI (1.03, 1.30)) of an increased likelihood of alcohol use during the past year.

Table 1. Logistic regressions (adjusted) at the first follow-up (T2, adolescent age 13,35 ± 0,62), the second follow-up (T3, adolescent age 14,32 ± 0,64) and the third follow-up (T4, adolescent age 16,95 ± 0,44) with adolescent *alcohol consumption* as outcome variable. In model 1, fathers drinking is excluded, in model 2, mothers drinking is excluded. The logistic regression is adjusted for parental marital status, adolescent gender, inebriation among peers, parental education and work situation, family history and access to alcohol.

	T2		T3		T4	
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Alcohol consumption (father)T1		1.25 (0.95–1.64)		1.06 (0.82–1.37)		**1.33 (1.08–1.65)**
Alcohol consumption (mother) T1	1.09 (0.88–1.35)		1.20 (0.99–1.47)		**1.47 (1.17–1.84)**	
Parental knowledge T1	0.58 (0.17–1.96)	1.20 (0.24–5.95)	1.20 (0.36–4.03)	2.26 (0.47–10.95)	3.75 (0.86–16.41)	4.00 (0.61–26.00)
Parental solicitation T1	0.81 (0.31–2.08)	0.64 (0.19–2.16)	1.03 (0.44–2.38)	0.79 (0.24–2.63)	**2.64 (1.02–6.83)**	1.65 (0.56–4.88)
Parental control T1	0.77 (0.39–1.52)	0.41 (0.15–1.12)	0.85 (0.46–1.59)	0.79 (0.33–1.92)	0.86 (0.41–1.80)	1.23 (0.53–2.84)
Adolescent disclosure T1	0.53 (0.19–1.50)	0.61 (0.14–2.74)	0.57 (0.22–1.49)	0.44 (0.12–1.59)	**0.18 (0.05–0.68)**	0.27 (0.06–1.24)
Novelty seeking T2	**1.15 (1.03–1.30)**	1.15 (0.97–1.37)	**1.16 (1.04–1.28)**	**1.31 (1.11–1.55)**	**1.15 (1.01–1.30**	**1.19 (1.02–1.39)**

Note: Bolded odds ratios are significant.

T3: The adjusted model showed statistical significance (χ^2 (14, $N = 297$) = 81.94, $p < .001$). Novelty seeking was significant (OR = 1.16, $p < .01$, 95% CI (1.04, 1.28)) for increasing the likelihood of alcohol use during the past year.

T4: The adjusted model showed statistical significance (χ^2 (14, $N = 203$) = 56.34, $p < .001$). Maternal alcohol consumption was a significant predictor (OR = 1.47, $p < .05$, 95% CI (1.17, 1.84)). Parental solicitation was significant (OR = 2.64, $p < .05$, 95% CI (1.02, 6.80)), and adolescent disclosure was also significant (OR = 0.18, $p < .02$, 95% CI (0.05, 0.68)). Novelty seeking in T4, as in T2 and T3, was a significant predictor (OR = 1.15, $p < .05$, 95% CI (1.01, 1.30)).

Father – adolescent dyads at T2, T3 and T4

T2: The adjusted model showed statistical significance (χ^2 (14, $N = 265$) = 64.58, $p < .001$). However, in the adjusted model, none of the study variables contributed significantly to the outcome of the logistic regression.

T3: The adjusted model showed statistical significance (χ^2 (14, $N = 222$) = 51.69, $p < .001$). Novelty seeking was significant (OR = 1.31, $p < .01$, 95% CI (1.11, 1.55)) for increasing the likelihood of alcohol use during the past year.

T4: The adjusted model showed statistical significance (χ^2 (14, $N = 152$) = 39.39, $p < .001$). Paternal alcohol consumption was a significant predictor (OR = 1.33, $p < .01$, 95% CI (1.08, 1.65)) and novelty seeking, as in T3, was a significant predictor (OR = 1.19, $p < .05$, 95% CI (1.02, 1.39)) of increased risk for alcohol use during the past year.

Predicting alcohol inebriation

Table 2 provides the adjusted models for predicting alcohol inebriation within the past year.

Mother – adolescent dyads at T2, T3 and T4

T2: The adjusted model showed statistical significance (χ^2 (14, N = 343) = 72.71, p < .001). Novelty seeking was the only significant predictor (OR = 1.39, p < .02, 95% CI (1.08, 1.78)) of an increased likelihood of alcohol inebriation during the past year.

T3: The model showed statistical significance (χ^2 (14, N = 298) = 91.10, p < .001). Novelty seeking in T3 was once again the only significant predictor (OR = 1.18, p < .01, 95% CI (1.03, 1.36)).

T4: The model showed statistical significance (χ^2 (14, N = 203) = 63.09, p < .001). Maternal alcohol consumption was a significant predictor (OR = 1.31, p < .05, 95% CI (1.06, 1.62)) and parental solicitation was significant (OR = 4.77, p < .01, 95% CI (1.85, 12.27)). Adolescent disclosure was also significant (OR = 0.27, p < .05, 95% CI (0.82, 0.91)). Novelty seeking in T4, as in T2 and T3, was a significant predictor (OR = 1.20, p < .01, 95% CI (1.07, 1.36)) of increased risk for alcohol inebriation during the past year.

Father – adolescent dyads at T2, T3 and T4

T2: The adjusted model showed statistical significance (χ^2 (14, $N = 265$) = 38.96, $p < .001$).Novelty seeking was significant (OR = 1.50, $p < .05$, 95% CI (1.06, 2.12)) for increasing the likelihood of alcohol inebriation during the past year.

T3: The adjusted model showed statistical significance (χ^2 (14, $N = 223$) = 61.18, $p < .001$). Paternal alcohol consumption was significant (OR = 1.70, $p < .05$, 95% CI (1.07, 2.68)) and novelty seeking was

Table 2. Logistic regressions (adjusted) at the first follow-up (T2, adolescent age 13,35 ± 0,62), the second follow-up (T3, adolescent age 14,32 ± 0,64) and the third follow-up (T4, adolescent age 16,95 ± 0,44) with adolescent alcohol *inebriation* as outcome variable. In model 1, fathers drinking is excluded, in model 2, mothers drinking is excluded. The logistic regression is adjusted for parental marital status, adolescent gender, inebriation among peers, parental education and work situation, family history and access to alcohol.

	T2		T3		T4	
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Alcohol consumption (father)T1		1.13 (0.74–1.67)		**1.70 (1.07–2.68)**		1.08 (0.89–1.31)
Alcohol consumption (mother) T1	1.32 (0.91–1.93)		1.04 (0.79–1.37)		**1.31 (1.06–1.62)**	
Parental knowledge T1	0.17 (0.02–1.32)	1.31 (0.11–15.12)	0.72 (0.16–3.19)	3.48 (0.41–29.71)	3.68 (0.84–16.10)	2.56 (0.47–13.82)
Parental solicitation T1	1.62 (0.25–10.62)	1.57 (0.20–12.44)	1.85 (0.61–5.62	1.01 (0.15–6.73)	**4.77 (1.85–12.27)**	2.39 (0.87–6.55)
Parental control T1	0.49 (0.13–1.91)	0.35 (0.05–2.64)	0.88 (0.39–2.00)	0.37 (0.09–1.55)	0.72 (0.35–1.46)	1.03 (0.49–2.15)
Adoelscent disclosure T1	0.23 (0.03–1.64)	0.28 (0.02–3.55)	0.39 (0.12–1.27)	0.17 (0.03–1.17)	**0.27 (0.08–0.91)**	0.32 (0.09–1.15)
Novelty seeking T2	1.39 (1.08–1.78)	**1.50 (1.06–2.12)**	**1.18 (1.03–1.36**)	**1.53 (1.15–2.04)**	**1.20(1.07–1.36)**	1.07 (0.94–1.23)

Note: Bolded odds ratios are significant.

significant (OR = 1.53, $p < .01$, 95% CI (1.15, 2.04)) for increasing the likelihood of alcohol inebriation during the past year.

T4: The adjusted model showed statistical significance (χ^2 (14, $N = 151$) = 24.26, $p < .05$). In the adjusted model, none of the study variables contributed significantly to the outcome of the logistic regression.

In the appendix and supplementary table descriptive statistics and correlations among the study variables in the three different age groups are presented.

Discussion

This study aims to examine how alcohol consumption by mothers and fathers relates to likelihood of alcohol use and inebriation among adolescents aged 13–14 years (T2), 14–15 years (T3) and 17 years (T4). It also examines how parental monitoring (parental knowledge, control and solicitation), adolescent disclosure and novelty seeking are associated with the likelihood of adolescent alcohol use and inebriation.

The teen years entail a fundamental transition from being a child to becoming an adult individual by the end of adolescence. For each passing year, teenagers develop physically, in their relationships and in their behavioural patterns. The present study is rooted in Jessor's (1991) Problem behaviour theory concerning risk factors for problem behaviour during adolescence. Regarding the risk of being influenced by and imitating parental alcohol habits, our point of departure was also derived from Bandura's social cognitive theory, which describes how learning occurs through indirect modelling of other important people in the environment, where parents serve as essential role models (Mares et al., 2015). In the current study, we conducted frequent follow-ups of adolescent alcohol consumption, which we see as a great advantage since we expected the impact of different risk factors to vary, depending on the age of the teenager, and based on the findings of an earlier study, which investigated how risk and protective factors vary with age (Thompson et al., 2015). Based on our three follow-ups, we have been able to identify a transition point between the 13-14-year age group, where a minority of adolescents have used alcohol, and the 17-year age group, where more than half have both consumed alcohol and become inebriated. To our knowledge, no singular prior study has explored the collective explanatory value of alcohol consumption by both parents, parental knowledge and control, adolescent disclosure and temperamental novelty seeking, where we also take into account prior alcohol consumption, peers who drink to the point of inebriation, divorce, hereditary predisposition, access to alcohol, parental level of education and working conditions, as well as gender.

Overall, the study findings showed that the largest recurring risk factor during adolescence (aged 13–17 years) relating to alcohol consumption and inebriation among adolescents is novelty seeking, a temperament trait associated with sensation-seeking behaviour, impulsivity, and inhibitory behaviour (Garcia et al., 2017; Zuckerman et al., 1964). The results are consistent with an array of prior studies that have found that novelty seeking or similar traits increase the risk of experimenting with alcohol, becoming inebriated and developing dependence (e.g. Boson et al., 2019; Thompson et al., 2015). The present study has taken several different factors into account. This means that an adolescent with the relevant personality traits will try alcohol and/or become inebriated regardless of peer behaviour, gender, prior experience with alcohol/inebriation, access to alcohol, experience of parental divorce or parental socioeconomic status.

The present study shows that especially in the 17-year old age group, alcohol consumption by both mothers and fathers is important for risk of adolescent alcohol consumption, where the likelihood of alcohol use among adolescents increases with increased alcohol consumption by both mothers and fathers, while the risk of adolescent inebriation increases with increased alcohol consumption by mothers. In the 14-15-year age group, paternal alcohol consumption was also an important factor for risk of adolescent inebriation – increased paternal alcohol consumption

increased the likelihood of adolescent inebriation. In the youngest age group, however, there was no association between parental alcohol consumption and adolescent alcohol consumption or inebriation. These results are in line with several studies (Mahedy et al., 2018; Rossow et al., 2016) and strengthen the evidence that parental alcohol consumption affects adolescent drinking behaviour, especially in the late teenage years, and that the most likely explanation for this association stems from social cognitive theory, in which parents serve as important role models (Bandura, 1986). It may be that the significance of parents as role models becomes more relevant the older the adolescents are, as shown in the current study. Among younger age groups, other factors are more relevant, especially curiosity, impulsivity and novelty seeking, as also shown in the current study. Our study has taken various factors into account, though we cannot rule out the potential importance of other parameters that we did not address, which may help to explain these associations – for example, how tolerant or conservative parents are concerning their views on adolescent alcohol consumption. A study by Ennett et al. (2016) identified four parental profiles: two profiles reflected conservative alcohol-specific parenting practices, while two reflected alcohol-tolerant practices, all within the context of other attributes. Alcohol misuse accelerated more rapidly between grades 6 and 10 in the two alcohol-tolerant profiles compared with their conservative counterparts. Results from the study by Ennett et al. (2016) suggest that maternal tolerance, in particular – even in the context of an effective parenting style and low parental alcohol use and problem use – is not an effective strategy for reducing risky adolescent alcohol use.

Parental knowledge concerning what children do during their leisure time (the peers with whom they spend their time, where they have been) and monitoring their children's activities (e.g. not permitting children to engage in a certain activity, requiring children to report what they have done and what friends accompanied them) had no importance at all in decreasing the risk of alcohol consumption and inebriation in the current study. Moreover, parental solicitation *increased* the likelihood of both alcohol consumption and inebriation in the 17-year-old age group, which is counter-intuitive to what may be expected. In other words, the more questions parents asked about what their children do during leisure time and what friends they spend time with, the greater the risk of adolescent alcohol consumption and inebriation. Perhaps the results were contrary to expectations because the parents experienced (justifiably) concern and therefore felt a need to ask more questions? One overview that examined studies concerning parent-child communication and parent-child relationships in regard to adolescent alcohol consumption found an association, albeit weak (Visser et al., 2012). A 2017 meta-analysis (Yap et al., 2017) that addressed an array of different parenting factors concluded that parenting does indeed have an impact on adolescent alcohol misuse, although the effect sizes were rather small. However, the evidence regarding the parent-child relationship and adolescent alcohol use may emerge as rather weak because families are targeted as homogeneous groups, rather than as heterogeneous groups consisting of different subgroups, where the impact of the parent – child relationship on alcohol use may be stronger in one subgroup than in another. A study by Mathijssen et al. (2014) did indeed find evidence of an association, but the quality of the parent-child relationship was different in different sub-groups of parents and adolescents. The current study examines general parental knowledge and control regarding adolescents; it may be that our results would have been different had we examined alcohol-specific parenting. Cox et al. (2018) assessed the influence of alcohol-specific parenting practices on adolescent alcohol use, adjusting for general parenting behaviours. Cautionary communication and rules about alcohol use protected against a full drink of alcohol and heavy alcohol use. But the co-variates in our study – general parental support and control – were also associated with reducing the likelihood of both consuming a full drink of alcohol and heavy alcohol use. Alcohol use and heavy drinking were assessed when the average age of the adolescents was 17.7 years.

As noted above (Ennett et al., 2016), there are also other facets of parental behaviour in relation to alcohol use that may be important, but that were not addressed by our study. Cultural differences in parenting styles between different countries could also have an influence on adolescent alcohol habits. The results from a study that examined differences in parenting styles in relation to adolescent alcohol use in the US and Sweden showed that parental monitoring regarding adolescent

alcohol use is less effective in Sweden than in the US (Carroll et al., 2016), which the authors suggest may be due to cultural differences between these countries.

Adolescent disclosure in our study, and as previous studies have shown (e.g. Stavrinides et al., 2010), related to a decreased likelihood of both alcohol consumption and inebriation; the more information that adolescents volunteered concerning what they did in their leisure time, the lower the risk of alcohol consumption and inebriation. Studies have also shown that the more information that adolescents volunteer about their experiences and what they do in their leisure time, the lower the risk of other problematic behaviours as well. However, since earlier research (Kapetanovic, Skoog, etal., 2020) has shown an association between adolescent personality traits and how these covary with volunteering information concerning their experiences, perhaps the desire to provide such information is primarily related to individual personality traits, which in turn may be strongly associated with their behaviour during leisure time? The study showed that personality moderated links between parental knowledge and its sources and adolescent substance use (ibid). In other words, this means that adolescents also influence communication and control between themselves and their parents; it is not just a one-way street.

Study limitations

Estimates of parental alcohol consumption are based on self-reporting and it cannot be ruled out that parents underreport their alcohol habits. Fewer parents than expected reported risk consumption, which leads us to believe that, in addition to underreporting of alcohol consumption, parents with serious problems did not participate in the study. Unfortunately, only one third of the queried parents participated in the survey. Since relatively few parents participated in the study, thereby resulting in a limited number of different parent-adolescent dyads, it is possible that we did not have sufficient statistical power to reveal predictors that may nevertheless be of significant importance. Due to the low number of responses where both mothers and fathers answered the questionnaire concerning one and the same adolescent, we decided to carry out separate analyses for fathers and mothers, because otherwise too many responses would have been lost to us. This meant that we could not investigate the combined contribution from mothers and fathers concerning the alcohol consumption of their adolescents into one and the same analysis, which of course would have been interesting to explore. While parental level of education and work situation are one indicator of socioeconomic status, they are not sufficient in and of themselves. It would have been better to precisely determine socioeconomic status, since this parameter is meaningful to the understanding of adolescent alcohol consumption and inebriation. We have taken heredity into account, but the impact of this factor would have been further strengthened had we had access to genetic information on the adolescents.

Conclusion

The results of the present study show that alcohol consumption by parents is of significance for adolescent alcohol consumption and inebriation, especially in the 17-year-old age group, a finding also supported by earlier studies (Mahedy et al., 2018; Rossow et al., 2016). The results from our study strengthens the evidence supporting the idea that parental alcohol consumption impacts adolescent alcohol consumption. Our study also shows that both maternal and paternal alcohol consumption is important in this regard.

Moreover, our results show that the degree of adolescent novelty seeking, which can largely be understood as an inherent behavioural pattern that is strongly rooted in adolescent genetics, has a powerful impact on both alcohol consumption and inebriation, regardless of parental drinking patterns, communication patterns between parents and children, and parental control. Consequently, parents need to pay extra attention to adolescents who demonstrate inherent curiosity, impulsivity and boundary-pushing behaviour.

Regarding parent-child communication, our study showed that this had no significance with the exception of parental solicitation, which surprisingly increased the likelihood of alcohol consumption and inebriation. In this regard, the present study is not in line with the findings from some earlier studies, which have shown that the various aspects of parental monitoring have an impact on adolescent alcohol consumption and inebriation. It should, however, be noted that other studies, just as in this study, have not found clear connections either (Mahedy et al., 2018). Perhaps additional subgroups of parents – adolesents should be investigated, as in the study by Mathijssen et al. (2014) in order to gain a more nuanced understanding of parental monitoring. Concerning voluntary adolescent disclosure regarding their personal experiences, as expected this parameter reduced the likelihood of alcohol consumption and inebriation, a finding that is in line with earlier studies (e.g. Stavrinides et al., 2010).

In summary, our results show that adolescent novelty seeking (inherent impulsivity, curiosity and risk-taking) is the most significant parameter for explaining alcohol consumption and inebriation during adolescence up to the age of 17 years. Parental alcohol consumption is also important, especially in the 17-year-old age group, while parental knowledge and control over adolescents had no significant impact in our study. Teenagers who voluntarily relate their experiences are at less risk for alcohol consumption and inebriation, but since a previous study have also shown that novelty seeking reduces voluntary disclosure (Kapetanovic, Bohlin, etal., 2020), this may pose a complication to this association, which should be further explored in future studies. Parents of children with a high level of novelty seeking should pay extra attention to their children's activities and generally reflect on their own alcohol consumption from their perspective as role models.

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